

REMARKS

Claim 1 has been amended to include the features of previous Claims 3 and 4. Claim 3 has been modified significantly and is now directed to a feature of the present invention that the Applicants regard as particularly inventive. The basis for this claim may be found on Page 1, Line 7 and Page 1, Lines 16-17 of the Applicants' Patent Specification. For the avoidance of doubt, austempered ductile iron referred to in the Application is also known as austempered ductile iron. Claim 4 has now been cancelled.

Election/Restrictions

The Examiners comments in Paragraphs 1 and 2 of the Official Action are acknowledged. It is noted that Claims 9-18 are withdrawn from further consideration in the present Application, in accordance with the Applicants' previous election.

Rejection under 35 U.S.C. Section 103

Previous Claims 1-8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Mikolajczyk (U.S. Patent No. 5,095,981) in view of Fuller (U.S. Patent No. 4,081,203) or Fischer (U.S. Patent No. 5,031,709) or Grayson (U.S. Patent No. 3,648,612) or Rivas et al. (U.S. Patent No. 4,913,230). It is noted that Fuller, Fischer, Grayson and Rivas et al. mention tempered materials as stated in the Official Action. Amended claim 1 refers to a centralizer comprising austempered ductile iron. It is submitted that none of the cited documents disclose or suggest the use of austempered ductile iron. Therefore, even if a person of ordinary skill in the art could combine Mikolajczyk with any other cited document, their combination would not

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arrive at the invention claimed because no document discloses or suggests the use of austemperized ductile iron.

Applicants have considered In re Leshin, 227 F.2d 197, 125 USPQ 416 (C.C.P.A. 1960) (referred to by the Examiner). It is respectfully submitted that the present Application is distinguished from this case because it is not well known to use tempered material for casing centralizers and the use of austemperized ductile iron is not well known in general and certainly not well known within the oil industry.

In general and with reference to 35 U.S.C. Section 103(a), it is submitted that the use of a particular material for a particular component may or may not be within the capability of a person having ordinary skill in the art, just as any other alteration may or may not be within the capability of the ordinarily skilled person. The Applicants respectfully submit that the equivalent criteria should be used to evaluate the obviousness of the use of a particular material as one would to evaluate the obviousness of any other alteration.

Applicants have already submitted that any combination of the cited documents would not provide all the features of the invention claimed. Applicants also respectfully submit that there would be no motivation for the skilled person to temper a casing centralizer. It is submitted that the ordinarily skilled person would know that tempering or heat treatment causes products to expand in an unpredictable manner. Moreover, the subsequent cooling of the material causes the material to shrink in an unpredictable manner. For centralizers, these problems are particularly acute because of the blades therearound which vary the overall thickness of the centralizer from point to point, the thickness of a centralizer at a point which includes a blade is greater than the thickness of the centralizer at a point which does not include a blade which results in non-

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uniform expansion and shrinkage of the centralizer and particularly unpredictable dimensions of the end product.

The person with ordinary skill in the art would also appreciate that the dimensions of the outer annular body and the bore of the centralizer need to be exact to provide a tight fit between. For example, the bore and the bore hole and also between the inner bore and the tubular. Improper dimensions would result in the tubular not being centralized (contrary to the function of the product) or the centralizer simply not fitting for example, into the bore hole or around the tubular and so being impossible to use.

In addition to the changes in size of the blades causing difficulties with the accuracy of centralization, the internal diameter of the centralizer would also be subject to variation during the tempering process. This is particularly important for variations of the invention that are in the form of casing centralizers, as it is generally known that these devices need to fit onto the casing very precisely, in order to function as casing centralizers. If the internal diameter was even fractionally too small, the centralizer could stick on the casing and cause the casing to jam in the hole when being inserted. This could cause very significant damage to the well that could be uneconomic to repair.

Indeed many operators will not even use ductile iron down hole because it is generally brittle and failure down hole can require expensive intervention and lengthy tool downtime.

In contrast to these established prejudices, the inventors of the present invention have discovered that austempered ductile iron has surprising benefits in that it does not expand and shrink to the degree that would be expected and so is, in fact, suitable as a material for

centralizers, contrary to what would be expected or attempted by a person of ordinary skill in the art.

Embodiments of the invention can be far smaller than previous centralizers (of the order of 15 centimeters in length compared with 25-30 centimeters in length for previous centralizers) because of the strength of the austempered ductile iron; such a reduction in size provides considerable cost savings. It is submitted that if it were obvious to use austempered ductile iron for centralizers then such a product would have been disclosed before now because of the significant savings in cost that can be enjoyed.

Therefore, it is submitted that claim 1 involves an inventive step. As all other claims depend on claim 1, it is submitted that all claims involve an inventive step. Removal of the rejection under 35 U.S.C. Section 103(a) is respectfully solicited.

Although it is firmly submitted that the combination of Mikolajczyk with any one or a combination of Fuller, Fischer, Grayson or Rivas would not teach or suggest all the limitations of new claim 1, it is further submitted that there are a number of reasons why Mikolajczyk would not be combined with these documents in order to develop a tempered centralizer.

Fuller teaches against heating the steel above its critical temperature (see Column 2, Lines 19-21) whereas the present invention requires the steel to be raised above its critical temperature to the austenite phase (see Page 10, Lines 11-12 of the Applicants' Patent Application) before being quenched. An austempered ductile iron according to Claim 1 cannot be made without heating the iron in this way. Therefore the present invention proceeds contrary to the teaching of Fuller and it is submitted that one of ordinary skill in the art would not proceed

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contrary to such teaching. It is also noted that Fuller is “exclusively concerned with a drill string stabilizer” (Column 2, Lines 29-30 of Fuller).

Fischer relates to a drill and has a replaceable ring 10, which is tempered onto the drill shaft. It is submitted that a person of ordinary skill would not combine a disclosure relating to a drill with one relating to a centralizer.

There is no hint in Grayson to temper the main body of the centralizer and indeed no motivation is present to do so because the wires take the strain, and therefore it is submitted that combining these documents would not result in a tempered centralizer.

Rivas et al. teaches to provide a centralizer within production tubing with a hardness less than the hardness of the material forming the production tubing (see, for example, the Abstract, Claim 1 and Column 4, Lines 4-5 of Rivas et al.). An object of the present invention is to provide a durable, hard, centralizer and this is achieved by using austempered ductile iron. Therefore it is submitted that a person of ordinary skill in this area would not look at Rivas et al when attempting to arrive at the present invention because it teaches to provide a centralizer which is deliberately intended to be softer than the production tubing, contrary to the present invention.

Therefore, it is respectfully submitted that these documents would not be combined by a person of ordinary skill but even if they were so combined, their combination does not include all the limitations of amended Claim 1. Moreover there are clear problems associated with heat treatment of centralizers that dissuade the ordinary skilled person from tempering centralizers and there is doubt as to whether the cited documents would be combined by one of ordinary skill in the art.

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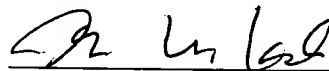
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Conclusion

All objections and rejections have been complied with, properly traversed, or rendered moot. Thus, it now appears that the patent application is in condition for allowance. Favorable consideration and allowance are earnestly solicited.

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Respectfully submitted,



Kevin M. Kercher
Reg. No. 33,408
Blackwell Sanders Peper Martin LLP
720 Olive Street, 24th Floor
St. Louis, Missouri 63101
(314) 345-6000
ATTORNEY FOR APPLICANTS